CLAIMS

What is claimed is:

1. A tunable laser module comprising:

a laser operating a first wavelength value; and

a waveguide wavelength locker coupled to said laser for tuning said first wavelength value of said laser to a desired wavelength value.

2. The tunable laser module of claim 1 wherein said waveguide wavelength locker includes a detector.

3. The tunable laser module of claim 2 wherein said waveguide wavelength locker generates an error signal based on a difference between said first wavelength value and said desired wavelength value.

4. The tunable laser module of claim 3 further comprising:

a controller connected to said waveguide wavelength locker and said laser.

5. The tunable laser module of claim 4 wherein said controller generates a laser control signal based on said error signal, and wherein said laser control signal adjusts said first wavelength value to said desired wavelength value.

6. The tunable laser module of claim 1 wherein said waveguide wavelength locker includes a silica waveguide with a first strong grating that is spaced from a second strong grating.

7. The tunable laser module of claim 4 wherein said waveguide wavelength locker includes a passive waveguide connected to a Mach-Zehnder interferometer having first and second arms with unequal lengths, wherein said Mach-Zehnder interferometer is connected to a first detector.

8. The tunable laser module of claim 7 wherein said waveguide wavelength locker further includes a grating connected to a second detector.

9. The tunable laser module of claim 8 wherein said second detector generates a reference signal having a peak at a fixed wavelength value.

10. The tunable laser module of claim 9 wherein said waveguide wavelength locker further includes a passive coupler that is connected to a third detector.

11. The tunable laser module of claim 10 wherein said third detector generates a normalization signal.

12. The tunable laser module of claim 11 wherein said controller receives said alternating signal, said reference signal and said normalization signal and generates a laser control signal therefrom.

13. The tunable laser module of claim 1 wherein said laser is mounted on a first temperature controlled package and said waveguide wavelength locker is mounted on said first temperature controlled package.

14. The tunable laser module of claim 4 wherein said waveguide wavelength locker includes first, second and third Mach-Zehnder interferometers with different asymmetries, wherein said first, second and third Mach-Zehnder interferometers are connected to first, second and third detectors.

15. The tunable laser module of claim 14 wherein said second Mach-Zehnder interferometer has a frequency response that is different than that of said first Mach-Zehnder interferometer and said third Mach-Zehnder interferometer has a frequency response that is different than that of said second Mach-Zehnder interferometer.

16. The tunable laser module of claim 15 further comprising a passive broadband waveguide connected to a fourth detector.

17. The tunable laser module of claim 16 wherein said first, second, third and fourth detectors are connected to said controller and wherein said controller addresses a lookup table using outputs of said first, second and third Mach-Zehnder interferometers.

18. A wavelength locker for a tunable laser module comprising:

a planar waveguide formed from silica that receives light from a laser;

a first strong grating formed in said planar waveguide; and

a second strong grating formed in said planar waveguide and located a first distance from said first strong grating, wherein said first and second strong gratings act as broadband reflectors to isolate a first wavelength of said light and wherein a value of said first wavelength is related to said first distance.

19. The waveguide locker of claim 18 further comprising a detector coupled to said planar waveguide.

20. The waveguide locker of claim 19 further comprising a controller coupled to said detector and said laser that adjusts an output wavelength of said laser based on an error signal received from said detector.

21. A wavelength locker for a tunable laser module, comprising:

a Mach-Zehnder interferometer that receives light from a laser and has first and second arms with unequal lengths; and

a grating that receives light from said laser.

22. The wavelength locker of claim 21 further comprising:

a first detector coupled to said Mach-Zehnder interferometer; and

a second detector coupled to said grating.

23. The wavelength locker of claim 22 wherein a wavelength response of said first detector is an alternating function of wavelength having spaced peaks.

24. The wavelength locker of claim 23 wherein said second detector generates a reference signal having a peak at a fixed wavelength value.

25. The wavelength locker of claim 24 wherein said wavelength locker further includes a passive splitter that receives light from said laser and that is connected to a third detector.

26. The wavelength locker of claim 25 wherein said third detector generates a normalization signal.

27. The wavelength locker of claim 26 wherein said first, second and third detectors are connected to a controller that generates a laser control signal based on said alternating signal, said reference signal and said normalization signal.

28. The wavelength locker of claim 27 wherein said laser is mounted on a first temperature controlled package and said waveguide wavelength locker is mounted on said first temperature controlled package.

29. A wavelength locker for a tunable laser module, comprising:

a first Mach-Zehnder interferometer that receives light from a laser and has a first arm asymmetry; and

a second Mach-Zehnder interferometer that receives light from a laser and has a second arm asymmetry.

30. The wavelength locker of claim 29 further comprising:

a third Mach-Zehnder interferometer that receives light from a laser and has a third arm asymmetry.

31. The wavelength locker of claim 30 further comprising:

a first detector coupled to said first Mach-Zehnder interferometer;

a second detector coupled to said second Mach-Zehnder interferometer; and

a third detector coupled to said third Mach-Zehnder interferometer.

32. The wavelength locker of claim 31 wherein said second Mach-Zehnder interferometer has a frequency response that is different than said first Mach-Zehnder interferometer and said third Mach-Zehnder interferometer has a frequency response that is different than said second Mach-Zehnder interferometer.

33. The wavelength locker of claim 32 further comprising a passive waveguide connected to a fourth detector.

34. The wavelength locker of claim 33 wherein said first, second, third and fourth detectors are connected to a controller and wherein said controller normalizes first, second and third signals generated by said first, second, and third detectors using a fourth signal generated by said fourth detector.

35. The wavelength locker of claim 34 wherein said controller accesses a lookup table using outputs of said first, second and third detectors.